

NON-PUBLIC?: N
ACCESSION #: 8908170315
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Waterford Steam Electric Station Unit 3 PAGE: 1 of 6

DOCKET NUMBER: 05000382

TITLE: Manual Reactor Trip due to Loss of Feed Flow to Steam Generator Number
1

EVENT DATE: 07/15/89 LER #: 89-013-00 REPORT DATE: 08/14/89

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: T. R. Leonard, Maintenance Superintendent TELEPHONE:(504) 464-3138

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: JB COMPONENT: ECBD MANUFACTURER: W120
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On July 19, 1989, Waterford Steam Electric Station Unit 3 was operating at 100% power when a rapidly decreasing level was observed in Steam Generator number 1. The Main Feedwater Regulating valve for this steam generator was found closed. The controller for the valve was switched to manual and the valve was opened in an attempt to restore the steam generator level. When it became apparent that the level could not be restored before receiving a low Steam Generator level Reactor trip, a manual Reactor trip was initiated.

The root cause for the event was attributed to a circuit failure in the position control circuitry for the Main and Startup Feedwater Regulating valves for Steam Generator number 1. The circuit card containing the failed component was replaced and the system restored to normal. During the course of this event no threat to the health or safety of the public or plant personnel existed.

END OF ABSTRACT

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On July 19, 1989, at 0719 hours, Waterford Steam Electric Station Unit 3 was operating at 100% power when Steam/Feedwater Flow Signal Deviation alarms (EIIS Identifier IB-FFA) were received for both Steam Generators (SG) (EIIS Identifier SG). Control room personnel immediately noted that the Main Feedwater Regulating valve (MFRV) (EIIS Identifier SJ-FCV) for SG number 1 was closed and that the level in SG number 1 was rapidly decreasing. At that time all controllers (EIIS Identifier FCO) for the Feedwater Control System (FWCS) (EIIS Identifier JB) were in the automatic mode of operation. The controller for the closed MFRV was placed in manual and the valve was reopened in an attempt to restore the level in SG number 1. When it became apparent that the level in SG number 1 could not be restored before receiving a low SG level Reactor trip from the Reactor Protection System (RPS) (EIIS Identifier JC), Control Room personnel manually initiated a Reactor trip. This was approximately 20 seconds after receipt of the Steam/Feedwater Flow Signal Deviation alarms. The prompt action taken by Control Room operators of initiating a manual Reactor trip prevented a challenge to the RPS that would have occurred at a lower SG level than was experienced at the time of the trip.

The Emergency Feedwater (EFW) pumps (EIIS Identifier BA-P) and their associated valves were the only Safeguards equipment (EIIS Identifier JE) that automatically actuated during the course of the event. This is the anticipated response to this type of transient.

Control Room personnel initiated actions required by the plant's Emergency Entry procedure and Uncomplicated Reactor Trip procedure. Plant conditions were stabilized in Mode 3 (Hot Standby).

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Because this event involved manual actuation of the RPS, it is reportable pursuant to 10 CFR 50.73 (a)(2)(iv). During the course of this event no threat to the health or safety of the public or plant personnel existed.

The root cause of the closure of the MFRV was a malfunction that occurred in the FWCS circuitry. Instrumentation and Control maintenance personnel found that a Series Control (NCB) circuit card located in Process Analog

Control (PAC) cabinet 29 had failed. This card is utilized in conjunction with the circuitry of number 1 FWCS, when the system is in automatic, to produce the position demand signals sent to the Main and Startup Feedwater Regulating valves for SG number 1. When the NCB card failed, the position demand signal for the valves went to zero, resulting in closure of the Main and Startup Feedwater Regulating valves for SG number 1.

The failed NCB card was replaced and calibration checks were performed on the control circuit. The FWCS for SG number 1 was then found to function satisfactorily in the automatic mode.

Two courses of action are presently being pursued to prevent the recurrence of single process and control circuit failures of this type from causing significant upsets in plant conditions. Problem Evaluation Information Request 61236 has been initiated to directly address the problem of PAC card circuit failures. The evaluation is intended to:

1. Identify those PAC system circuit cards, which upon failure, have the potential to result in a significant upset in plant conditions.
2. Determine what actions should be taken to reduce the failures resulting from aging components experienced with these cards.

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Additionally, a design change to install a newly designed digital FWCS is presently under evaluation for possible installation during the fourth refueling outage. The system will have redundant input signals with the capability to discriminate when an input circuit is malfunctioning, will continue controlling the feedwater system using the remaining operable input, and indicate this condition to the operator. The system will also have a feedback feature to monitor for failures occurring between the FWCS and the control board master controller and will fail over to a redundant control loop when a failure in this circuitry occurs. This design change is expected to significantly improve the reliability of the automatic controls for the feedwater systems.

SIMILAR EVENTS

On May 25, 1987, a fuse failed in a PAC Tracker Driver (NTD) circuit card used to control the speed of Main Feedwater Pump (MFP) (EIIIS Identifier SJ-P) B. When this occurred the output signal from the circuit card to the pump speed circuitry dropped to zero and the pump ran back to minimum speed and discharge pressure. This resulted in an automatically initiated Reactor trip on low SG level. This event was reported in LER-87-016.

On March 15, 1987, an intermittent malfunction occurred in the FWCS circuitry resulting in an automatically initiated Reactor trip on high SG level. The specific cause was not conclusively determined, however a suspect Feedwater Flow Square Root Extractor was replaced and temporary recorders were installed to monitor key FWCS signals for one month. This event was reported in LER-87-008.

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The following similar malfunctions have occurred since the computerized Station Information Management System became operational in mid-1987. None of these occurrences resulted in a Reactor trip.

On December 6, 1988, with the plant in Mode 1, operators took manual control of MFP A due to decreasing level in SG number 2. A PAC NTD circuit card used in control of the speed for MFP A had malfunctioned and was replaced.

On September 21, 1988, with the plant in Mode 1, the recirc valve for MFP B failed open due to a failure found in a PAC NTD circuit card used in the feedwater flow circuitry.

On July 28, 1988, with the plant in Mode 1, fluctuations were observed in the speed of MFP A due to a failure found in a PAC NTD circuit card used in control of the speed for MFP A.

On July 5, 1988, with the plant in Mode 1, MFRV for SG number 1 would not respond properly to the position controller. A PAC NTD circuit card used in the position control circuitry for the MFRV had failed and was replaced.

On May 27, 1988, with the plant in Mode 3, the controller for SG number 1 MFRV would not switch into automatic or control in manual. The PAC NTD circuit card used in the position control circuitry for the MFRV had failed and was replaced.

On November 20, 1987, with the plant in Mode 1, erratic control of speed was observed with MFP A in the automatic and manual modes. A failure was found in a PAC NTD circuit card used in the speed control circuitry for MFP A.

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On November 11, 1987, with the plant in Mode 1, erratic control of speed was observed with MFP B. A failure was found in a PAC NCB circuit card used in the speed control circuitry for MFP B.

On May 23, 1987, with the plant in Mode 1, erratic control of speed was observed with MFP A. A failure was found in a PAC NCB circuit card used in the speed control circuitry for MFP A.

PLANT CONTACT

T.R. Leonard, Maintenance Superintendent, 504-464-3138.

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Ref: 10CFR50.73(a)(2)(iv)

LOUISIANA POWER & LIGHT/
WATERFORD 3 SES P.O. BOX B KILLONA, LA 70066-0751

MIDDLE SOUTH
UTILITIES SYSTEM

W3A89-0170
A4.05
QA

August 14, 1989

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, D.C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Reporting of Licensee Event Report

Gentlemen:

Attached is Licensee Event Report Number LER-89-013-00 for Waterford Steam Electric Station Unit 3. This Licensee Event Report is submitted pursuant to 10CFR50.73(a)(2)(iv).

Very truly yours,

J. R. McGaha
Plant Manager - Nuclear

JRM/KTW:rk
(w/Attachment)

cc: Messrs. R. D. Martin
J. T. Wheelock - INPO Records Center
E. L. Blake
W. M. Stevenson
D. L. Wigginton
NRC Resident Inspectors Office

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